DETAILED ACTION

Response to Arguments

Applicant's arguments filed 12/17/2009 have been fully considered but they are not persuasive regarding claims 1-14 and 17-20

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the specific means of applying isostatic pressure) are not recited in all of the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Specifically, claims 1-14 and 17-20 do not require the limitation that the pressure is applied by using Argon as a isostatic pressure medium. Thus the language of claims 1-14 and 17-20 do not provide patentable distinction form the type of isostatic pressure disclosed by Cohn et al.

Applicant's arguments, with respect to the rejection(s) of claim(s) 15 and 16 under 35 U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Baker et al. (US 6,189,766 B1). Baker et al. discloses a conventional Hot Isostatic Pressure bonding apparatus which uses Argon as the pressure medium to apply isostatic pressure for bonding a semiconductor substrate.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1- 14 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bhat et al. (US 5,207,864) in view of Cohn et al. (US 7,276,789 B1).

Regarding claim 1, 11, 12, 14, 19, Bhat et al. discloses a method for semiconductor wafer bonding, the method comprising steps of:

providing semiconductor wafers to be bonded (Bhat, Abstract);

cleaning the surfaces of wafers to remove particle and chemical contaminants and provide bonding surfaces comprised of the entire surface of the wafers (Bhat, Abstract);

bringing the bonding surfaces of the wafers into direct contact with each other to weakly bond the wafers to each other (Bhat, Abstract (i.e. “van der Waals force”);

placing the wafers in a pressurization chamber (Bhat, Abstract);

applying bonding pressure to the wafers (Bhat, Col. 6 lines 3-11);

heating the wafers during said step of applying bonding pressure (Bhat, Abstract); and

controlling and maintaining said steps of heating and applying bonding pressure for a period of time to substantially strengthen bonding between the wafers (Bhat, Col. 6 lines 3-11);

Bhat et al. does not specify that the pressure is applied solely through isostatic pressure. It was however known to those of ordinary skill in the art to solely apply an isostatic type of pressure when bonding wafers. At the time of the invention it was conventional use hot press bonding as well as Hot Isostatic Press or Hot Isostatic Processing (HIP) diffusion bonding. HIP is known conventional means of applying evenly controlled pressure. It would be obvious to one of ordinary skill in the art to select isostatic means for applying pressure when bonding wafers. For an examples of one of ordinary skill in the art applying isostatic pressure when performing a diffusion bonding process see Cohn et al. (entire document).

"*Still another alternative for supplying the necessary pressure and heat is to place a substrate pair into a high-temperature bag (made of a material such as polyimide or metal foil) and subject it to hot -isostatic-pressing*."

It would have been within the scope of one of ordinary skill in the art at the time of the invention to combine the teachings of Bhat and Cohn to enable the pressure step of Bhat to be performed according to the teachings of Cohn because one of ordinary skill would have been motivated to look to alternative

suitable methods of performing the disclosed pressure step of Bhat and art recognized suitability for an intended purpose has been recognized to be motivation to combine. MPEP § 2144.07.

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill in the art has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. KSR Int'l Co v. Teleflex Inc.

Regarding claim 2, Bhat in view of Cohn disclose the method of claim 1, further comprising steps of: cooling the wafers; and removing the wafers from the pressurization chamber (Bhat, Col. 6 line 10).

Regarding claim 3, Bhat in view of Cohn disclose the method of claim 2, wherein said step of cooling is conducted while said step of controlling and maintaining continues said step of applying bonding pressure, followed by a step of depressurization (Bhat, Abstract).

Regarding claim 4, Bhat in view of Cohn disclose the method of claim 1, wherein said step of controlling and maintaining comprises: creating a temperature ramp and a pressure ramp to substantially strengthen bonding

between the wafers (Bhat, Entire document—the process disclosed by Bhat is to improve bonding which implicitly mean to strengthen bonding);

Regarding claim 5, Bhat in view of Cohn disclose the method of claim 4, wherein said step of controlling and maintaining creates the temperature ramp as a function that is independent from the pressure ramp (Bhat, Abstract).

Regarding claim 6, Bhat in view of Cohn disclose the method of claim 1, wherein said step of heating commences prior to said step of applying pressure (Bhat, Abstract).

Regarding claim 7, Bhat in view of Cohn disclose the method of claim 1, wherein said step of heating commences with or after said step of applying pressure (Bhat, Abstract).

Regarding claim 8, Bhat in view of Benavides and/or Curbishley disclose the method of claim 1, wherein said step of cleaning creates hydrogen terminated surfaces at the semiconductor surfaces to be bonded (Inherent result of HF dip).

Regarding claim 9, Bhat in view of Cohn disclose the method of claim 1, wherein said step of bringing creates one of a Van der Waals and Hydrogen bond (Bhat, Abstract).

Regarding claims 10 and 13, Bhat in view of Cohn disclose the method of claim 9, wherein said step of bringing brings the semiconductor surfaces to be bonded into direct contact with each other with or without an intervening layer (direct and indirect bonding are known in that art. The selection of the two types of bonding, indirect or direct bonding, is a matter of design choice which is dependent upon the materials which are being bonded. One of ordinary skill in the art would be able to select one of the two known process on the base of its suitability

Regarding claim 17, Bhat in view of Cohn disclose the method of claim 1, wherein said steps of providing, cleaning and bringing are repeated to form a plurality of weakly bonded pairs of wafers and said steps of applying, heating, and controlling and maintaining are carried out with the plurality of weakly bonded pairs of wafers simultaneously in the pressurization chamber (Bhat, Abstract).

Regarding claim 18, Bhat in view of Cohn disclose the method of claim 1, further comprising, prior to said step of placing, loading said wafers in an unsealed container, and wherein said step of placing is carried out by placing said unsealed container in said pressurization chamber (Bhat, Abstract).

Regarding claim 20, Bhat in view of Cohn disclose the method of claim 19, further comprising a step of controlling said heating and pressing to induce strain in at least one of said wafers (inherent result of heat/pressure bonding process).

Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bhat et al. in view of Cohn et al. in view of in further view of Baker et al. (US 6,189,766 B1).

Regarding claims 15 and 16, Bhat in view of Cohn disclose the method of claim 1, however are silent upon further teaching that Argon can be used as a pressure medium within a HIP chamber. At the time of the invention Argon gas was a known pressure medium selected for use in a HIP. As disclosed by the prior art reference Baker et al. Conventional HIP bonding apparatus which use Argon as the pressure medium allow for “stress free" bonding and is an ideal choice when using isostatic pressure to bond semiconductor substrates. (Baker et al. Col. 6, lines 9-52).

Therefore it would be obvious to one of ordinary skill in the art at the time of the invention to select isostatic means to apply pressure since it was known at the time to be a function equivalent means to apply pressure, and further select a conventional commercial Hot Isostatic Pressure bonding apparatus which uses Argon as pressure medium since it was known to provide the benefit of “stress free” thermal bonding of semiconductor substrates.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JARRETT J. STARK whose telephone number is (571)272-6005. The examiner can normally be reached on Monday - Thursday 7:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jarrett J Stark/
Examiner, Art Unit 2823

1/13/2010
/J. J. S./
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